

## Low-cost advanced HD decoding IC for TV

Data brief

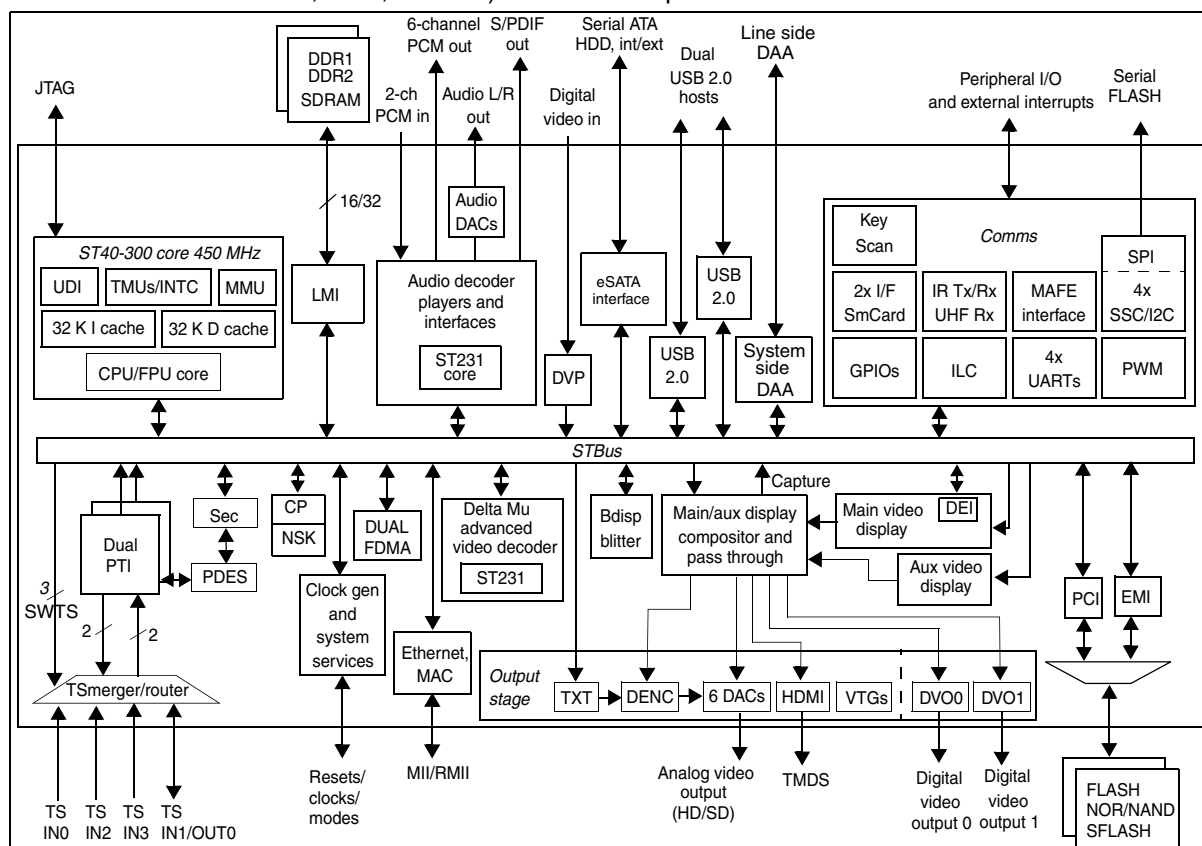
### Features

- Advanced high definition video decoding (H264/VC-1/MPEG2)
- Advanced standard definition video decoding (H264/VC-1/MPEG2/AVS)
- Advanced multi-channel audio decoding (MPEG 1, 2, MP3, DD/DD+, AAC/AAC+, WMA9/WMA9pro)
- Linux, Windows CE, and OS21 compatible ST40 applications CPU (450 MHz)
- 32-bit DDR1/DDR2 compatible local memory interface
- Multi-stream, DVR capable transport stream processing
- Extensive connectivity (dual USB hosts, e-SATA, Ethernet MAC/MII/RMII, MPX, and PCI)

- Advanced security and DRM support including SVP, MS-DRM, and DTCP-IP
- DVD data decryption

### Description

The ST-9150 uses state of the art process technology to provide an ultra low-cost, fully featured HD AVC decoder IC. It is a highly integrated system-on-chip suitable for TV markets across all networks (cable/satellite/DTT/x-DSL/IP) worldwide. The ST-9150 is targeted at the latest Operator and CE manufacturer requirements for TVs which utilize advanced HD decoding (H264/VC-1/MPEG2), and which conform to DVB, ISMA, ATIS-IIF, SCTE, DirecTV, ATSC, ARIB, CEA, ITU, OpenCable and MSTV specifications.



# 1 Description

The ST-9150 provides a solution for operators to specify a range of low-cost, high performance HD TVs including low-cost Zappers, IP clients, Interactive TVs, DVR standalone and DVR server/home network capable TVs, and with content delivery possible using broadcast or broadband networks, or both (hybrid TVs). The ST-9150 keeps pace with the latest conditional access, DRM and trusted platform requirements of major operators worldwide by incorporating the latest generation of advanced security features.

The ST-9150 offers current users of STs growing family of advanced decoding ICs enhancements in performance and features whilst reducing cost and time-to-market for the next generation deployments.

## 2 Main features

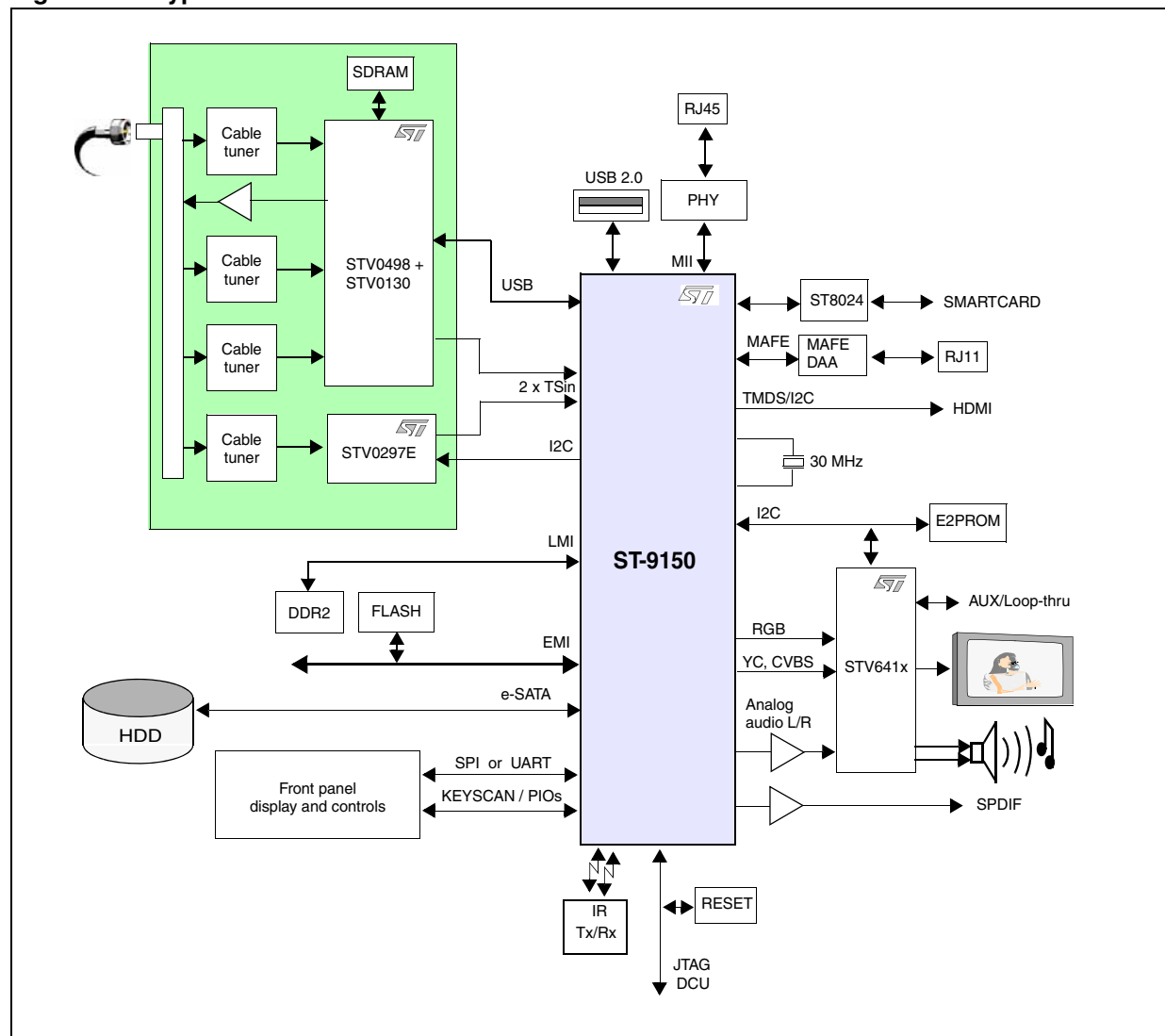
The ST-9150 is a new, advanced decoding SoC targeted at next generation HD TVs (cable, terrestrial, satellite, DSL, IP, and Hybrid), and has the following features:

- Integrates in a single IC, Multi-stream transport demux, CPU, A/V decode, Video processing, Graphics and Display, Advanced security, TV peripherals, Audio/Video DACs, Digital A/V outputs, HDMI, e-SATA port, dual USB ports and Ethernet MAC/MII/RMII
- High performance CPUs for applications (ST40) and audio/video decoding (2 x ST231)
  - ST40-300, dual-issue, applications CPU, 32KI, 32KD caches:  
Target speed > 450 MHz delivering > 800DMIPs
- Single 32-bit DDR1/DDR2 Local Memory Interface (LMI), up to 400 MHz
- Latest generation “Delta” Video Decoder with ST231 programmable CPU core:
  - MPEG2, H264, VC-1/WM9, HD or SD Advanced Video Decoding
  - AVS SD decoding
  - Provides flexibility to support other codecs (DivX, XviD, H263 encode/decode)
  - HD and SD decoding or dual SD Decoding, PIP & Mosaic capable
  - Real-time transcoding of MPEG2 SD to H264 SIF
- Advanced de-blocking and de-ringing of decoded MPEG2 SD sources based on ST’s DSE (Digital Source Enhancer) Technology with 2D analysis window and Texture Adaptive Filter
- ST231 CPU based Audio Decoder. MPEG1 I/II, MP3, Dolby Digital/DD+, MPEG4 AAC/AAC+ multi-channel audio decoding. Concurrent audio description decoding. DD+ and AAC+ transcoding
- Main and Aux Video display pipelines:
  - Main: high quality H & V reformatting/resizing with sample rate conversion/filtering. Motion adaptive spatial and temporal de-interlacing for 480p/576p and 1080p60 progressive output
  - Aux: high quality H & V reformatting/resizing with sample rate conversion/filtering
- Three independent graphics planes with H&V resize, CLUT and anti-flicker filtering
- Link list based 2D graphics blitter. Up to 200 Mpixels/sec with destination alpha blending. Capable of 3D user interface effects.
- Independent Main and Aux display compositions (Video/Graphics mixing)
- Pass-through display for graphics, main video or aux video output concurrently with main and aux compositions
- HD display capture and down-conversion for concurrent HD and SD output of the main composition
- HDMI interface with HDCP copy protection (HD/ED/SD formats up to 1080p60). HDMI interface is in full compliance with all features of v1.3a, excluding deep color, enhanced colorimetry (xvYCC, gamut metadata), and DST/DSD audio features.
- 16-bit Digital Video Output for main display composition (HD/ED/SD formats up to 1080p60)
- Second 24-bit Digital Video Output for pass through display or main/aux display compositions (HD/ED/SD formats up to 1080p60)
- Macrovision and Dwight Cavendish copy protection support

- PAL/NTSC/SECAM Digital encoder
- Six 10-bit DACs for component/composite analog video output (HD/ED/SD formats up to 1080i)
- SD/HD Digital Video Input port, 8- or 16-bit YCbCr
- Integrated Stereo Audio DAC
- Six-channel Audio PCM Output Interface
- Stereo Audio PCM Input Interface
- Independent SPDIF output
- Quadruple external TS inputs, triple internal TS from memory
- Dual DVB-CI+ (HD/SD profiles) modules supported
- Multi-stream transport stream de-multiplexing, 333 Mbits/sec, Quadruple tuner DVR capable
- DVB/DES/AES/Multi-2/ICAM descrambling
- CSS (DVD-video) and CPPM (DVD-audio) decryption is provided for the DVD stream.
- Dual USB 2.0 host interfaces both with PHY
- Integrated 10/100 Ethernet MAC/MII/RMII, Wake on LAN, 75 MHz (300 Mbits/sec) capable
- 16-bit External Memory and Peripheral Interface (EMI) - up to five banks
- Interfacing to, and boot from, NOR or NAND FLASH
- Interfacing to, and boot from, serial FLASH
- 32-bit, 66 MHz, PCI Interface, shared on EMI with access interleaving possible
- MPX Interface/protocol for high speed, glue-less, communications with STv0498 DOCSIS Cable FE
- DVR supported, with HDD attachment through e-SATA, EIDE (PIO mode) or USB
- Soft Modem support: integrated MAFE: integrated system side DAA (Si-Labs)
- Dual Multi-channel Flexible DMA Controllers
- TV Peripherals
  - Two Smart Card interfaces, four UARTs, four SSC/I2C, GPIO banks with alternate functions, IR Tx/Rx, UHF Rx/SCD, PWM, ILC, HDMI CEC, 4 x 4 key matrix scanner
- Advanced security - Secure control words, Code authentication, JTAG locking, Network/DVR copy protection, SVP, VGS, DTCP-IP, MS-DRM, MSTV
- Package - FPGBA 27 x 27mm, 620 balls, 7R32x32, Pitch 0.8 mm, Ball 0.5 mm.

### 3 Applications overview

Figure 1. Typical DVR cable TV with DOCSIS



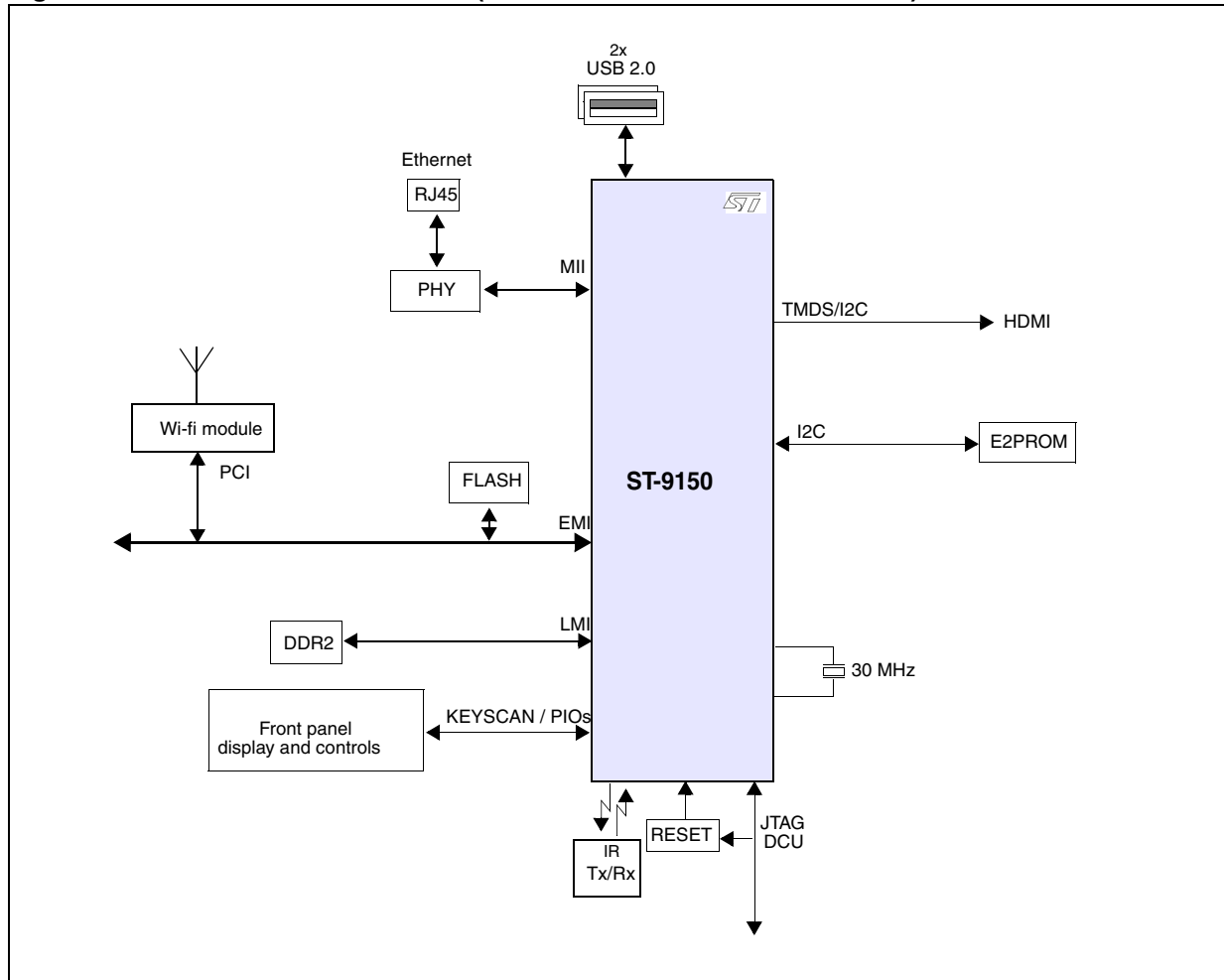
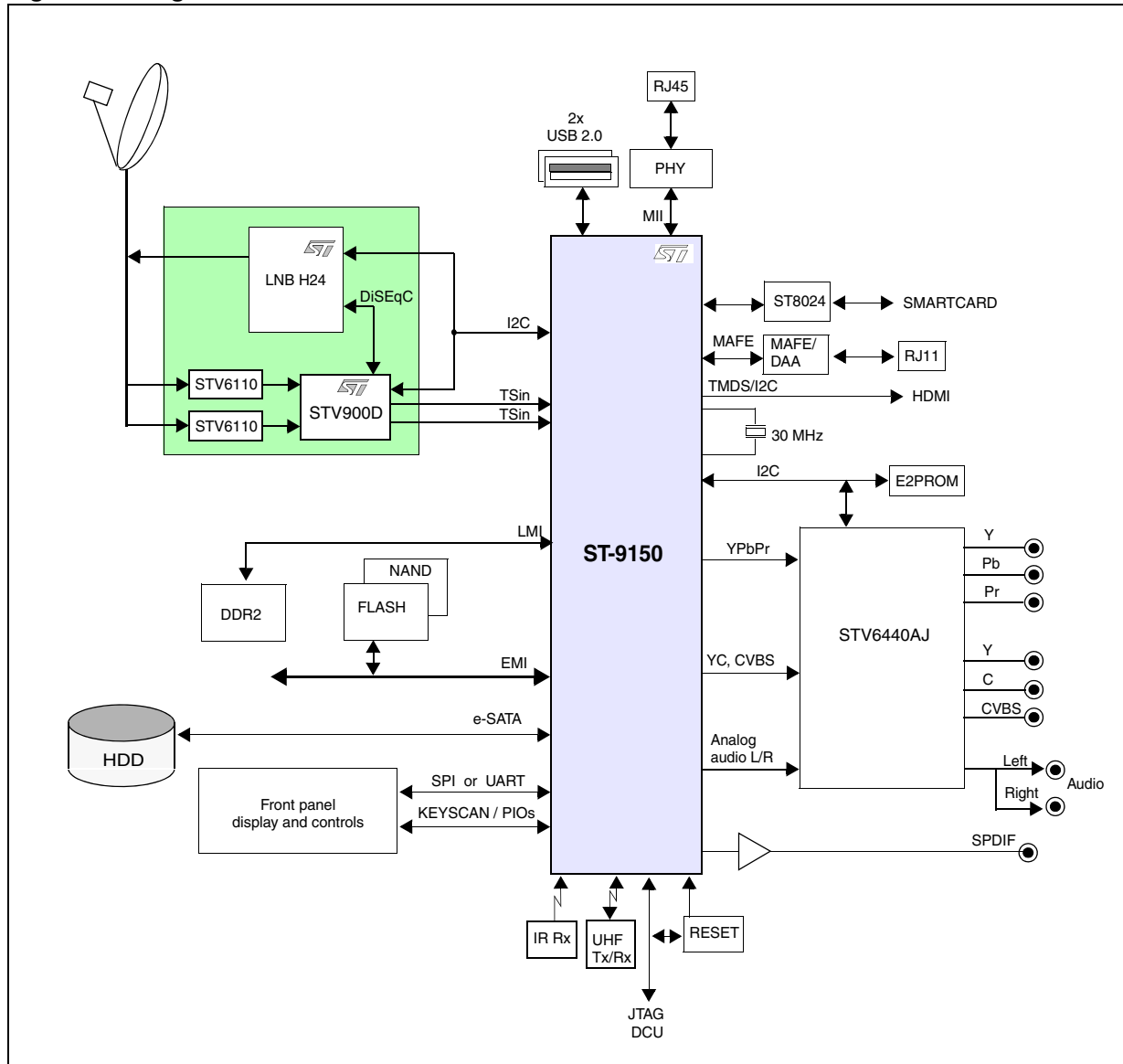
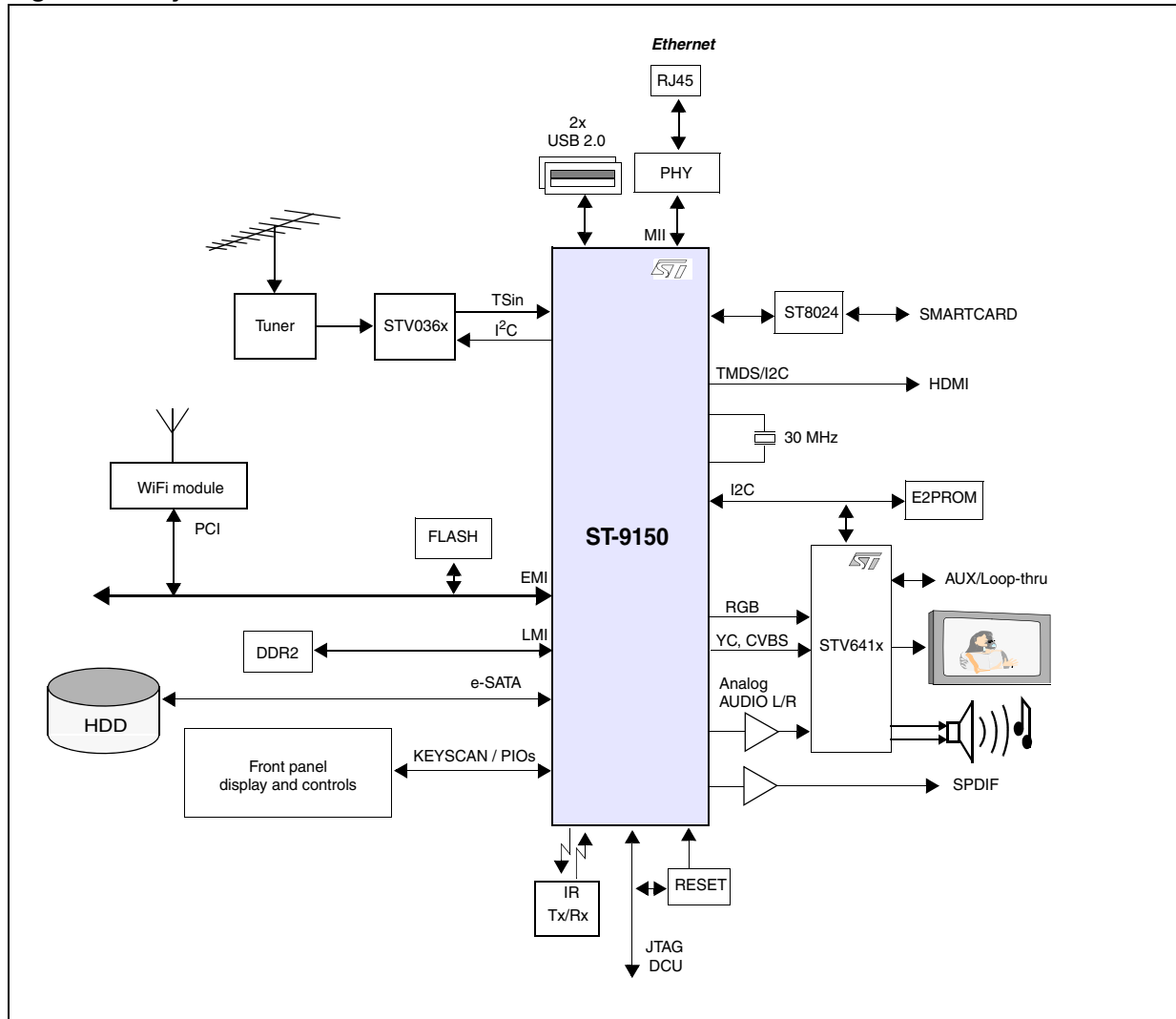
**Figure 2. Low cost IP client HD TV (wired ethernet or WiFi connection)**

Figure 3. High definition DVR satellite TV



**Figure 4. Hybrid DTT/Broadband TV with DVR and WiFi home network**



## 4 Ordering information

**Table 1. Ordering information**

Order code	Packaging
ST-9150ZUB	FPBGA 27 x 27 mm

## 5 Revision history

**Table 2. Document revision history**

Date	Revision	Changes
30-Nov-2009	1	Initial release.
14-Sep-2010	2	Removed reference to CPRM in Section 2.

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